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FILED WITH *SMALL ENTITY STATUS*

IAM03078

SPRING-BASED CRANKSHAFT COUPLING STRUCTURE FOR ENGINE

BACKGROUND OF THE INVENTION

1. Field of the invention

The present invention relates to an internal combustion end and, more specifically, to a spring-based crankshaft coupling structure for use in an engine to connect a crankshaft to a piston and to increase the output torque of the engine.

2. Description of the Related Art

In a typical internal combustion engine, of the type found in most vehicles today, a plurality of pistons are respectively movably mounted in a plurality of cylinders formed in an engine block. Each of the pistons has one end connected with a piston rod and the other end coupled to a crankshaft. When spark plugs in the engine block fired to ignite fuel mixture, the pistons are driven downward to turn the crankshaft, which ultimately drives the entire vehicle. At present, in a typical engine, connecting rods are used and connected with the respective first end to the corresponding piston and the respective second end to the corresponding crankshaft. The connecting points between the two ends of each connecting rod and the corresponding piston and corresponding crankshaft are disposed at the ends of the longitudinal center axis of the respective connecting rod. By means of the coupling of the connecting rod between the corresponding piston and the corresponding crankshaft, reciprocating motion of the piston causes the corresponding

crankshaft to rotate.

Presently, researchers have reported many studies to enhance the output torque by extending the moving distance of the connecting rods between the pistons and the crankshafts.

SUMMARY OF THE INVENTION

The present invention has been accomplished under the circumstances in view. It is one object of the present invention to provide a crankshaft coupling structure for engine, which greatly enhances the output torque of the engine.

It is another object of the present invention to provide a crankshaft coupling structure for use engine, which saves fuel consumption of the engine.

It is still another object of the present invention to provide a crankshaft coupling structure for engine, which improves the performance of the engine, resulting in reduced amount of solid matter in exhaust gas of the engine.

To achieve these and other objects of the present invention, the crankshaft coupling structure is installed in an engine and coupled between a piston and a crankshaft, comprising a first coupling member pivoted to the piston, the first coupling member comprising a downwardly extended receiving open chamber defined in a downwardly extended hollow body thereof and an inner tube suspended in the downwardly extended receiving open chamber inside the downwardly extended hollow body; a second coupling member pivoted to the crankshaft, the second coupling member comprising an upwardly extended hollow body inserted into the downwardly extended receiving open

chamber and axially movably sleeved onto the inner tube, and an upwardly extended receiving open chamber defined in the upwardly extended hollow body thereof and adapted to receive the inner tube and an axially compressible spring member mounted in the inner tube inside the first coupling member and coupled between the first coupling member and the second coupling member.

BRIEF DESCRIPTION OF THE DRAWINGS

The accompanying drawing is included to provide a further understanding of the invention, and is incorporated in and constitutes a part of this specification. The drawing illustrates an embodiment of the invention and, together with the description, serves to explain the principles of the invention. In the drawing,

FIG. 1 is a plain view showing the spring-based crankshaft coupling structure coupled between a piston and a crankshaft according to the present invention.

FIG. 2 is a sectional view, showing the detailed structure of the spring-based crankshaft coupling structure coupled between a piston and a crankshaft according to the present invention.

FIG. 3 is a schematic drawing showing the action of the spring-based crankshaft coupling structure according to the present invention...

FIGS. 3A~3D are schematic drawings showing one moving cycle of the spring-based crankshaft coupling structure with the piston from the top dead center to the bottom dead center and then from the bottom dead center back to the top dead center according to the present invention.

DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

Reference will now be made in detail to the preferred embodiment of the present invention, examples of which are illustrated in the accompanying drawings. Wherever possible, the same reference numbers are used in the drawings and the description to refer to the same or like parts.

Referring to FIGS. 1~3, a spring-based crankshaft coupling structure **2** is shown comprised of a first coupling member **21**, a second coupling member **22**, and an axially compressible spring member **23**.

The first coupling member **21** is pivoted to a piston **A** by a pivot pin **210**, comprising a downwardly extended hollow body **211**, a receiving open chamber **212** defined in the hollow body **211**, an inner tube **213** suspended in the receiving open chamber **212**, and a stem **214** coaxially suspended in the inner tube **213**.

The second coupling member **22** is pivoted to a crankshaft **B** by a pivot pin **220**, comprising an upwardly extended hollow body **221**, which is inserted into the receiving open chamber **212** inside the hollow body **211** and axially movably sleeved onto the inner tube **213**, a receiving open chamber **222** defined in the hollow body **221** and adapted to receive the inner tube **213**, and a stem **223** suspended in the receiving open chamber **222** corresponding to the stem **214** in the first coupling member **21**.

The spring member **23** according to the present invention is a compression spring mounted inside the inner tube **213** and connected between the stem **214** of the first coupling member **21** and the stem **223** of the second

coupling member **22**. The spring member **23** imparts an outward pressure to the second coupling member **22** against the first coupling member **21**, i.e., the spring member **23** forces the second coupling member **22** away from the first coupling member **21**.

Further, in order to prevent disconnection of the second coupling member **22** from the first coupling member **21**, a stop structure is provided. According to this embodiment, the stop structure comprises a first annular stop flange **215** radially inwardly protruded from the bottom end of the Hollow body **211** of the first coupling member **21**, and a second annular stop flange **224** radially outwardly protruded from the top end of the hollow body **221** of the second coupling member **22**. The outer diameter of the second annular stop flange **224** is approximately equal to the inner diameter of the hollow body **211** of the first coupling member **21** so that the second annular stop flange **224** can be moved with the second coupling member **22** smoothly and stably in the receiving open chamber **212** along the inner tube **213**. The inner diameter of the first annular stop flange **215** is approximately equal to the outer diameter of the hollow body **221** of the second coupling member **22**. When extending the second coupling member **22** out of the first coupling member **21**, the second annular stop flange **224** will be stopped at the first annular stop flange **215**, preventing disengagement of the second coupling member **22** from the first coupling member **21**.

Referring to FIGS. 3A~3D, when the spring-based crankshaft coupling structure **2** moved with the piston **A** to the top dead center in the

combustion engine, the second coupling member **22** is lifted to compress the spring member **23**. During the down stroke of the piston **A** from the top dead center in the combustion engine toward the bottom dead center, the spring member **23** is released to force the second coupling member **22** outwards relative to the first coupling member **21**. Therefore, the invention extends the stroke of the spring-based crankshaft coupling structure **2**, enhancing the output torque of the engine...

As indicated above, the spring-based crankshaft coupling structure of the present invention uses two coupling members sliding one with the other to couple the crankshaft to the piston and an axially compressible spring member to join the coupling members. This arrangement greatly enhances the output torque of the engine. Because the invention greatly improves the performance of the engine, it makes the engine to save fuel consumption and to reduce waste gas production.

A prototype of spring-based crankshaft coupling structure for engine has been constructed with the features of FIGS. 1~3. The spring-based crankshaft coupling structure for engine functions smoothly to provide all of the features discussed earlier.

Although a particular embodiment of the invention has been described in detail for purposes of illustration, various modifications and enhancements may be made without departing from the spirit and scope of the invention. Accordingly, the invention is not to be limited except as by the appended claims.